

# Drivers for Decision Change in Getting Vaccinated against COVID-19: A Retrospective Cross-sectional Study

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## ABSTRACT

**Background.** A certain percentage of the vaccinated population initially did not want to get vaccinated but changed their minds (from 30% to 70%). By October 2022, World Bank reported that the Philippines had 77.8% COVID-19 vaccination rate. Knowing the factors that changed their decision can help improve the vaccination rate.

**Objective.** This survey aimed to identify the factors that influence positive change in vaccination decisions.

**Methods.** This survey was conducted in the Philippines among Filipinos aged 18-80 years old between March to April 2022. The dependent variable in the study was decision change, a binary variable coded as 1 for a vaccinated person who changed their decision from no to yes and 0 for an unvaccinated person who did not change their decision from yes to no.

**Results.** Age (adjusted odds ratio [aOR] = 0.92, 95% CI = 0.89-0.96) and having a college degree (aOR=11.707, 95% CI=3.23-42.41) are related to changing decisions. Young and college degree holders are likely to change their decisions positively about getting vaccinated. Employer requirement also influences decision change because it affects a person's livelihood. High scores on vaccine confidence (aOR = 1.181, 95% CI = 1.12-1.25) and awareness (aOR = 1.318, 95% CI = 1.08-1.61) are associated with decision change.

**Conclusion.** Being young, educated, employed with a requirement to vaccinate, and having high vaccine awareness and confidence are strongly associated with a positive change in the decision to get vaccinated.

**Keywords:** vaccination, vaccine awareness, decision change, COVID-19

## INTRODUCTION

A few years before the COVID-19 pandemic happened, vaccine confidence in the Philippines dropped from 93% in 2015 to 32% in 2018. Similarly, perceptions of vaccine safety dropped from 82% in 2015 to 21% in 2018.<sup>1</sup> Larson et al. cites that these significant drops in Filipinos' perspectives toward vaccines could be attributed to the Dengvaxia vaccination in the country, which started in 2016.<sup>1</sup>

Dengvaxia, a dengue vaccine manufactured by the French pharmaceutical Sanofi Pasteur, was introduced to the Philippines in April 2016. One year later, after about 830,000 partially vaccinated Filipino kids, Sanofi announced that after reanalyzing Dengvaxia's efficacy, inoculating children who have not had prior dengue fever could lead to more serious diseases.<sup>2</sup> This fueled unprecedented discourses and debates over the government's immunization programs and led to



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Filipinos' lack of confidence in vaccines. Coming from this scenario, when the pandemic started in the later part of 2019 towards the early part of 2020, convincing the Philippine population to avail of the COVID-19 vaccine when it became available in the country proved to be a challenge.

In the Philippines, vaccination for COVID-19 began in March 2021.<sup>3</sup> When the survey was conducted in September of the same year, only 30% of the population had been fully vaccinated.<sup>4</sup> In the first quarter of 2022, at the time when this research was conducted, approximately 70% of the whole population received the vaccine.<sup>5</sup> A World Bank article published on 10 October 2022 reported that the country had achieved a 77.8% vaccination rate, its actual target of 70 million doses, by the end of June 2022.<sup>6</sup>

Vaccination uptake and reach in the Philippines are affected either collectively or individually by individual, interpersonal, and structural barriers.<sup>4</sup> A scoping review by Al-Jayyousi et al. revealed that some of the elements that affect the attitudes of the general population towards COVID-19 vaccination include socio-demographic characteristics, individual, social, and organizational factors, and the attributes of COVID-19 vaccines.<sup>7</sup> For instance, individual drivers for changes in vaccination decisions have been notably shaped by rumors and myths, such as claims that vaccines cause severe side effects.<sup>8</sup> These factors, similar to the Dengvaxia scare, have deterred many from getting vaccinated. Interpersonal barriers, on the other hand, involve the influence of family, friends, and community leaders on vaccination decisions. Family dynamics and peer influence are particularly strong among Filipinos.<sup>9</sup> If influential family members or friends are skeptical about vaccines, this skepticism can spread within their social circles. Hence, strong endorsements from trusted family members or community leaders can positively influence vaccination decisions.<sup>10</sup>

Transitioning from vaccine hesitancy to acceptance is a complex and challenging process due to the multifaceted nature of hesitancy itself. Specifically, concerns about potential adverse effects, both immediate and long-term, can evoke substantial apprehension that becomes deeply ingrained and challenging to alleviate.<sup>11</sup> False information, particularly those that are perpetuated through social media channels, presents a formidable challenge in terms of correction.<sup>12</sup> Similarly, past medical scandals, such as the Dengvaxia incident, have contributed to eroding trust in vaccines and healthcare providers. However, a recent study indicated that individuals who have easy access to healthcare facilities and those who received accurate information about Dengvaxia from healthcare professionals tended to have more positive perceptions about vaccination.<sup>13</sup> Hence, by understanding and addressing these challenges, public health initiatives can more effectively promote vaccine acceptance and improve public health outcomes. Health and vaccine promotion campaigns could be designed based on factors that could transform vaccine hesitancy to vaccine acceptance resulting from this study.

## OBJECTIVES

This survey aimed to identify the factors that influence positive change in vaccination decisions, that is, from a decision of not getting vaccinated to getting vaccinated. In particular, factors considered were advice from a healthcare professional, COVID-19 information sources, COVID-19 vaccine awareness, worry related to COVID-19, functional health literacy, and vaccine confidence as well as socio-demographic characteristics like age, sex, educational attainment, employment status, income level, and health status.

## METHODS

### Research Design

This study is a part of a bigger retrospective cross-sectional survey done by Tejero et al. on determinants of vaccination decision among Filipinos during the first half of 2022.<sup>14</sup> The current study used a subset of the participants who initially refused to get the COVID-19 vaccine but eventually decided to avail of it, as the study precisely aims to pinpoint those factors that led to this decision change and, subsequently, consider these factors in formulating policy proposals aimed at increasing people's vaccine confidence. The participants are Filipinos residing in the Philippines, able to answer questionnaires either in English or Filipino, and aged between 18 to 80 years old.

There were 17 administrative regions in the country that were involved in the survey. Since the current study employs logistic regression, the minimum required sample size was calculated as 140, following the guideline by Concato, Peduzzi et al.<sup>15</sup> This guideline recommends a sample size of at least 10 times the number of variables included in the model. Target participants were Filipinos who can receive the COVID-19 vaccines, are residing in the Philippines, and are aged 18 – 80 years old. They should be able to answer the survey online and can read and understand Filipino and/or English.

The questionnaire included sections on demographic information, measures of vaccine awareness, sources of vaccine information, and constructs such as worry tendency, functional health literacy, and vaccine confidence. These constructs were meticulously defined through a comprehensive review of relevant literature and have been widely applied in similar contexts, ensuring their relevance and reliability. The first questionnaire created was in English and was translated into Filipino by a professional translator. Pilot testing of the English questionnaire to 25 individuals was done to check the clarity of the questions. Based on the comments obtained from the pilot testing, the questionnaire was revised. The questions were reordered, and the format was improved. The Filipino questionnaire was also piloted to 25 people and was modified to make the Filipino terms easier to understand.

Quota sampling was done to ensure that participants represent the 17 administrative regions in the Philippines and people who were not vaccinated. This sampling design is

to address the potential bias arising from the research design. The online questionnaire was disseminated through social media like Facebook and the network of the authors sent through emails and Viber messages. Participants were given the link to the questionnaire in both English and Filipino so they could answer the version they preferred. Anonymity of participants was maintained in this online survey. Around 9% that lived in remote areas, however, required the help of a trained research assistant interviewer. Participants were informed of the voluntary nature of their participation. The questionnaire included a consent statement, requiring participants to provide their consent before proceeding to complete the survey. Recruitment was done through social media platforms and email. Since participants were required to be at least 18 years of age, responding to the questionnaire implied the participant's consent to the study. Reimbursement was offered to participants who paid for internet services to answer the online survey. Participants were required to answer all the questions in the survey. Questionnaires that were not completely filled out were excluded from the analysis.

## Measures

The dependent variable in the study is decision change, a binary variable representing a vaccinated person who changed the decision from no to yes (N-Y) and an unvaccinated person who did not change the decision from yes to no. One survey question inquired if the respondent changed his/her present decision about COVID-19 vaccination to a different viewpoint. Seven independent variables and seven covariates were considered in the model that were hypothesized to influence vaccination decisions based on the work of Tejero et al.<sup>15</sup>

The independent variables are: advice by healthcare provider, COVID-19 Information sources (CVIS), Awareness of COVID-19 (AWARE), tendency to worry (WORRY), Functional health literacy (FHL), Vaccine confidence (VAXCON), and vaccination employer requirement. All demographic variables including health insurance were potential confounders and were considered covariates.

Positive advice given by a healthcare provider to get a vaccination was coded 1 in the model. CVIS comprised nine items describing how often information was obtained from social media (YouTube, Facebook, TikTok, Twitter, Instagram), broadcast media (radio, TV, newspaper), and government agencies. The regularity of accessing information was rated by participants using a five-point Likert scale from (1) never to (5) always. AWARE was assessed by the participants using nine questions formulated based on published information about COVID-19. Awareness was scored as 1 (correct), 0 (unaware), and -1 (incorrect) in the model.

WORRY was determined from a scale consisting of three items developed by Head et al. anchored at 1 (strongly disagree) to 5 (strongly agree).<sup>16</sup> FHL was measured using four items taken from Biasio et al., which were measured

from 1 (never) to 4 (often).<sup>17</sup> VAXCON, on the other hand, was measured using five items taken from Gilkey et al.'s 8-item Confidence Scale anchored at 0 (strongly disagree) to 1 (strongly agree).<sup>18</sup> The five items were about vaccine's capability to (1) protect health, (2) prevent diseases they are intended to prevent, (3) safety, and (4) have serious side effects. It also included (5) the good intentions of medical professionals administering vaccines.

## Data Analysis

Before conducting data analysis, the data underwent cleaning and validation. Surveys that were incomplete—defined as those started but not finished by a participant—were excluded from the analysis. Additionally, surveys with conflicting responses were omitted. Conflicting responses were identified by inconsistencies in answers to negatively worded questions.

For modeling purposes, socio-demographic data were treated as categorical variables except for age. Coding and scoring of responses were done using Excel. For AWARE, WORRY, VAXCON, CVIS, and FHL, scores were aggregated. Of the nine AWARE questions, items 3, 8, and 9 were all reverse-coded, WORRY, item 3 was reverse-coded and item 4 of VAXCON. All items in the FHL were reverse-coded. Questions that were negatively stated were reversed-coded for ease of interpreting the results.

Frequencies of categorical data such as socio-demographic characteristics, advice from HCP, vaccination requirement by employer, and health insurance were summarized using a tabular format, while the mean and standard deviation of continuous variables were computed. The factors affecting the change in the COVID-19 vaccine decision were identified using Binary logistic regression (BLR). The BLR model was constructed by including all the independent variables and covariates simultaneously. Prior to using BLR, the assumptions for using this method were checked such as independence of observation and multicollinearity. Strength of association between predictor and outcome variables was assessed using odds ratios (ORs): weak association if OR is close to 1, moderate association if OR is between 1.2–1.9 or 0.5–0.8, and strong association if OR is greater than 2 or less than 0.5. Model fit was assessed using the Nagelkerke R<sup>2</sup>.

The SPSS 21.0 was used for data analysis.<sup>19</sup> The significance level considered was 0.05.

## Ethical Considerations

This research was evaluated and approved by the University of the Philippines Manila Research Ethics Board (UPMREB) with protocol number UPMREB 2021-0673-01.

Vulnerable persons in terms of age were excluded in this study since only those aged 18 years old and above were allowed to access the questions. With the approval of UPMREB, a formal informed consent was waived since the act of answering the questionnaire constituted consent

of the participant. Nevertheless, a cover letter was provided at the start of the online questionnaire where necessary information were indicated like study objectives, anonymity, benefits and risks (minimal), duration, data utilization, contact information of researchers, among others. Privacy and autonomy of participants were ensured. Due compensation was given to those who indicated their interest.

## RESULTS

The complete survey responses obtained were 1,462 out of a total of 2,268. Only completed surveys were analyzed in this study. For this paper, only 154 unvaccinated individuals without any decision change (no change group-NCG) and 147 vaccinated individuals with decision change (change group-CG) were included in the analysis.

### Participants' Socio-demographic Characteristics

The sociodemographic characteristics of the 301 individuals considered in the analysis are shown in Table 1. The

**Table 1.** Sociodemographic Characteristics of Participants

Sociodemographic Characteristics	No Change (N=154)	Change (N=147)	Total (N=301)
<b>Age (years)</b>			
≤20	21 (14)	44 (30)	65 (22)
21 – 30	28 (18)	53 (36)	81 (27)
31 – 40	22 (14)	20 (14)	42 (14)
41 – 50	25 (16)	14 (10)	39 (13)
51 – 60	29 (19)	10 (7)	39 (13)
61 – 70	19 (12)	6 (4)	25 (8)
71 – 80	10 (6)	0 (0)	10 (3)
<b>Sex</b>			
Male	57 (30)	35 (24)	92 (30)
Female	97 (70)	112 (76)	209 (70)
<b>Educational Attainment</b>			
Elementary to high school	61 (40)	12 (8)	73 (24)
College	77 (50)	109 (74)	186 (62)
Postgraduate	16 (10)	26 (18)	42 (14)
<b>Employment Status</b>			
Unemployed and retired	83 (54)	56 (38)	139 (46)
Government/ private/ self-employed	63 (41)	66 (45)	129 (43)
Student	8 (5)	25 (17)	33 (11)
<b>Income Level</b>			
Poor	81 (53)	75 (51)	156 (52)
Low-income	34 (22)	21 (14)	55 (18)
Lower middle-income	24 (16)	21 (14)	45 (15)
Middle-income	6 (4)	19 (13)	25 (8)
Upper middle-income	7 (5)	5 (3)	12 (4)
High-income and rich	2 (1)	6 (4)	8 (3)
<b>Health Status</b>			
Without long-standing illness	110 (71)	128 (87)	238 (79)
With long-standing illness	44 (29)	19 (13)	63 (21)

actual geographical distribution was not followed in the sample obtained. All administrative regions in the Philippines were represented in the sample consisting mostly of participants belonging to the 21-30 age range (27%) and then those younger than 21 (22%). Around eleven percent (11%) of the sample have ages higher than 60. Seventy percent (70%) of the sample were female. Most of the sample (76%) have finished a college degree, and 46% were either unemployed or retired. More than half (52%) are poor and do not have health insurance. Seventy-nine percent (79%) do not have a long-standing illness.

Some notable differences in the change and no-change groups can be seen in age, educational attainment, employment status, and employer requirements. Sixty-six percent (66%) of the CG came from participants younger than 21, much higher than the 32% of the NCG. The NCG participants' distribution is almost the same for all age groups. This trend is consistent with the 12% increase in the proportion of students in the CG. It can be observed that younger participants are likely to change their decision, and so are those with postgraduate degrees. Employers required vaccination for almost half of the decision changers.

### Participants' COVID-19-related Profile

Table 2 shows the COVID-19 profile of participants from the two groups. The scores of the CG are all higher than the NCG in terms of CVIS, awareness, worry, FHL, and VAXCON. The detailed characteristics of the dataset are summarized in the Appendix. The CG obtained information mainly from Facebook, followed by TV and family and friends, compared to the NCG, which came mainly from

**Table 2.** COVID-19-related Profile

Continuous Variables	No Change (N=154)	Change (N=147)	Total (N=301)
	Mean (SD)		
CVIS	29.4 (10.3)	34 (9.1)	31.6 (10)
AWARE	1 (2.8)	3.7 (2.2)	2.3 (2.9)
WORRY	9.6 (1.9)	10.2 (1.8)	9.9 (1.9)
FHL	9.4 (3.4)	9.6 (2.7)	9.5 (3.1)
VAXCON	18 (10.2)	34.2 (8.5)	25.9 (12.4)
Categorical Variables	Frequency (%)		
Advice from HCP			
No	72 (47)	44 (30)	116 (39)
Yes	82 (53)	103 (70)	185 (61)
Health Insurance			
None	87 (56)	71 (48)	158 (52)
Private	31 (20)	38 (26)	69 (23)
Public	25 (16)	20 (14)	45 (15)
Private and Public	11 (7)	18 (12)	29 (10)
Vaccination Employer Requirement			
No	134 (87)	76 (52)	210 (70)
Yes	20 (13)	71 (48)	91 (30)



family and friends, followed by TV. The low scores of the NCG indicate they searched for less information about the COVID-19 vaccination than the CG. The CG is more scared about getting infected, has greater awareness, and is more confident about the good effects of the vaccine. The functional literacy of the two groups is almost the same.

The ranking of confidence scores per group showed that they strongly believe that vaccines are necessary to protect health and prevent diseases. Low confidence was manifested by both groups on the potential side effects of the vaccine.

### Characteristics Associated with Change in Decision

The outcome derived from the binomial logistic model is presented in Table 3. Binary logistic regression analysis explored the factors associated with changing one's vaccination decision. Age (aOR = 0.92, 95% CI = 0.89-0.96) is related to changing decisions and having a college degree (aOR=11.707, 95% CI=3.23-42.41). Younger and highly educated people are likely to change their decisions positively about getting vaccinated. Employer requirement also influenced decision change, which can be reasonably expected because it affects a person's livelihood. High scores on VAXCON (aOR = 1.181, 95% CI = 1.12-1.25) and AWARE (aOR = 1.318, 95% CI = 1.08-1.61) are associated with decision change. The computed Nagelkerke  $R^2$  for the model is 0.79, which indicates good model fit.

The reasons for changing decisions were indicated in the survey and the top three answers are: to protect themselves, their family, and those they interact with from COVID-19, to help prevent the worsening of the pandemic, including the emergence of new variants, rising cases, and more death, and because vaccination is required by the government or higher authorities.

## DISCUSSION

The primary aim of this survey was to explore the factors that drive positive changes in vaccination decisions—specifically, the transition from a decision not to get vaccinated to a decision to receive a vaccine. Key factors examined included socio-demographic characteristics, advice from healthcare professionals, sources of COVID-19 information, awareness of COVID-19 vaccines, levels of worry related to COVID-19, functional health literacy, and vaccine confidence. Understanding these determinants provides valuable insights into the complex interplay of influences shaping vaccination decisions.

Changes in attitude towards COVID-19 vaccines are dependent on the period during the pandemic. The longitudinal survey in 2021 done by Markovic-Denic et al. showed a significant increase in vaccination uptake from the baseline attitude.<sup>20</sup> Globally, the vaccine acceptance rate went down in 2020, then increased in the early part of 2021, and continued to increase in 2022.<sup>21,22</sup> In this context, the

**Table 3.** Sociodemographic Characteristics, COVID-19-related Profile, and Information Sources Associated with Vaccination Decision according to Binomial Logistic Regression

	aOR (95% CI)	P value
<b>Age</b>	0.924 (0.89-0.96)	<0.01
<b>Sex</b>		
Male	Reference [1]	
Female	1.023 (0.32-3.22)	0.97
<b>Educational Attainment</b>		
Elementary to high school	Reference [1]	
College	11.707 (3.23-42.41)	<0.01
Postgraduate	4.245 (0.64-28.16)	0.13
<b>Employment Status</b>		
Unemployed and retired	Reference [1]	
Government/ private/ self-employed	2.051 (0.58-7.24)	0.26
Student	1.36 (0.35-5.32)	0.66
<b>Income Level</b>		
Poor	Reference [1]	
Low-income	0.285 (0.07-1.12)	0.07
Lower middle-income	0.552 (0.12-2.46)	0.44
Middle-income	0.744 (0.09-5.95)	0.78
Upper middle-income	0.677 (0.04-11.24)	0.79
High-income and rich	0.486 (0.03-8.34)	0.62
<b>Health Status</b>		
Without long-standing illness	Reference [1]	
With long-standing illness	0.434 (0.12-1.53)	0.19
<b>Employer Requirement</b>		
Not required	Reference [1]	
Required	12.584 (3.71-42.71)	<0.01
<b>Advice from HCP</b>		
No advice	Reference [1]	
With advice	1.572 (0.59-4.16)	0.36
<b>Health Insurance</b>		
None	Reference [1]	
Private	3.226 (0.85-12.18)	0.08
Public	1.072 (0.26-4.34)	0.92
Private and Public	1.827 (0.3-11.13)	0.51
CVIS	0.98 (0.94-1.03)	0.40
AWARE	1.318 (1.08-1.61)	0.01
WORRY	0.905 (0.7-1.17)	0.44
FHL	0.995 (0.85-1.16)	0.95
VAXCON	1.181 (1.12-1.25)	<0.01

present survey in the Philippines was conducted in March 2022, when the country experienced exponential increases in COVID-19 cases and deaths due to the waves brought about by the Delta variant in the 3rd quarter of 2021 and the Omicron variant in the first quarter of 2022. With the availability of COVID-19 vaccines given for free in the country and their reported effectiveness without many of the feared side effects, Filipinos gradually changed their attitudes on vaccination positively.<sup>23</sup> The initial hesitancy can be traced back to the 2017 Dengvaxia vaccine scare that happened in

the country.<sup>24</sup> Although there was an increased uptake of vaccination in the Philippines, the vaccination rate of 64.5% by mid-2022 was still lower than its neighboring countries like Malaysia, with 84.6% of its population vaccinated.<sup>25</sup> Thus, this present study contributes to the understanding of the factors that positively changed the decisions to get vaccinated against COVID-19, which will help address public health concerns.

Those who changed their decisions from not getting vaccinated to getting vaccinated indicated their topmost reasons as protection not only for oneself but also for family and people around them. This correlates with their vaccine confidence scores, which show that they strongly believe that vaccines are necessary to protect health and prevent diseases. The second most cited reason for changing decisions is to avoid the worsening of the pandemic with more variants and more COVID cases and deaths. These topmost reasons are centered on protection from COVID-19 for the welfare of the entire community and not only for oneself. It shows that the realization of the benefits accruing to the greater good is foremost in convincing people to take preventive action. This was further reinforced by their readings on the advantages of getting vaccinated, which likewise ranked high among the indicated reasons for positively changing decisions. These results corroborate with the prior research findings indicating that understanding the COVID-19 vaccine showed the greatest significant direct effect on the decision to get vaccinated.<sup>26</sup>

The characteristics of those who changed their decisions that significantly differed from those who did not change are younger age, higher educational attainment, higher levels of vaccine confidence, and employers requiring vaccination. Those who positively changed decisions were 30 years old and younger, and most of them were students. It is understandable that young people are more flexible in their opinions, especially among students, considering their openness to learning. In the survey done among Filipino students at the start of the pandemic in March-April 2020, most of the respondents indicated fear emanating from the myths and misinformation they gathered from television and the internet.<sup>27</sup> With more accurate and compelling information about COVID-19 and its vaccine, young people who readily accessed information from these sources were shown in this present study to have positively changed their decisions. The empirical findings suggest that the respondents' appreciation of medical evidence communicated to the public has improved. Thus, people's access to accurate information is a priority in policy directions.

Another characteristic that significantly differentiated those who positively changed their decisions to get vaccinated compared to those who did not is higher educational attainment. Respondents in this study who obtained a college education or higher were more open to changing their decisions positively. Prior studies have shown that the level of education plays a determining role in one's attitude towards vaccination against COVID-19. Zychlinsky Scharff et al.

reported that parental level of education influenced hesitancy towards COVID-19 vaccination.<sup>27</sup> Likewise, Yasmin et al. identified education as one of the key factors for COVID-19 vaccine uptake.<sup>28</sup> Thus, it is vital to consider the age and education level of the target population in initiating positive changes for public health. Those who are young and have a college education are best suited as early adopters who may eventually influence the larger population.

A higher level of vaccine confidence was shown in this study to significantly differentiate those who positively changed their decisions. The survey in 16 countries, including the Philippines, reported that confidence in COVID-19 vaccine safety and effectiveness was among the strongest predictors of vaccine acceptance.<sup>29</sup> Gaining confidence in the COVID-19 vaccine was a slow process in the Philippines because of the prior Dengvaxia vaccine fiasco. Widespread mistrust and fear towards vaccination were seen among communities.<sup>30</sup> Thus, more efforts were employed to overcome the prevailing fear through the effective use of media like TV and the Internet. As shown in this present study, those who changed their decisions obtained their information about COVID-19 mainly from Facebook, followed by television. The low scores of the NCG suggest a lower inclination to seek information about the COVID-19 vaccination compared to the CG. In contrast, the CG displays greater concern about infection, heightened awareness, and stronger confidence in the vaccine's effectiveness and benefits. The NCG group depended mainly on what their family and friends related to them. Moreover, the CG group actively searched for more information about the COVID-19 vaccination compared to the NCG. Thus, the CG group had greater awareness and more confidence about the good effects of the vaccine. It is important then to use relevant media to communicate the facts and devise means to encourage more people to read them.

Vaccination against COVID-19, as required by employers, differentiated the CG group from the NCG. It may seem that this was the compelling reason for the decision change, but it ranked third among the top reasons cited by those who positively changed their decisions. The benefits of the vaccine ranked topmost, which shows that the change was coming more from an inner conviction brought about by information gathered from various sources. Nonetheless, employers' requirements for vaccination contributed significantly to the uptake of the vaccine. In addition, establishments like shopping malls and restaurants required vaccination for customer admission, thereby adding more to people's motivation to get vaccinated. This was actually indicated by the CG group as one of the top-ranking reasons for their decision change. There are, however, some autonomy and privacy concerns raised against employers requiring vaccination for their constituents. Berkman et al. suggested ethically acceptable ways to strongly encourage, incentivize, and subtly pressure employees to get vaccinated.<sup>31</sup> These include communication of benefits and safety of vaccines

through peers and supervisors, and positive incentives, among others. It is worth noting that the current findings are similar to those of Tejero et al. on the COVID-19 vaccination decision.<sup>15</sup> For this study, however, the focus is on those who changed their unfavorable decision to a favorable one. This is a turning point that public practitioners aim to achieve in the attainment of public health goals. In conjunction with all the significant variables found in this study that drove people to change their minds, the mandatory vaccination in firms and establishments may have helped sway the opinion of the public favoring vaccination. A snowball effect may have occurred wherein as more people got vaccinated, others followed, considering the Filipino value of being with the community. Moreover, as more got vaccinated without the feared side effects and survived the disease, they became living testament to the effectiveness of the vaccine, convincing those around them to decide to get vaccinated.

In essence, the transition from vaccine hesitancy to vaccine acceptance holds profound implications in real-world settings across public health and societal domains. As communities navigate the complexities of hesitancy, overcoming these barriers can significantly enhance vaccination rates, thereby bolstering herd immunity against infectious diseases.<sup>32</sup> Increased acceptance fosters a safer environment for vulnerable populations who rely on community immunity, such as the elderly, young children, and immunocompromised individuals. Moreover, higher vaccination rates reduce the burden on healthcare systems by decreasing the incidence of preventable diseases and related hospitalizations.<sup>33</sup> Ultimately, bridging the gap from hesitancy to acceptance not only safeguards individual health but also fortifies community well-being on a broader scale.

Limitations of this study include the retrospective design in determining the change in the decision-making process. However, this was the most viable option that the researchers could employ, considering the constraints that the pandemic brought to the whole country. Nevertheless, the researchers ensured the accuracy of the responses by ascertaining the congruency of responses throughout every questionnaire. Those with conflicting responses were not included in the sample. Another limitation is the quota sampling since the ideal randomized sampling design could not be performed given the prevailing community restrictions at that time due to the pandemic. Nonetheless, the researchers endeavored to obtain a proportionate number of respondents from all the regions of the Philippines, following the reported proportion of those vaccinated versus the unvaccinated from each region. Thus, the nationwide population vaccination status was approximated.

## CONCLUSION

The results of the survey show that people who are young and educated, and those with employers who require vaccination are also likely to change their decision towards

getting vaccinated. High vaccination confidence and awareness are also significant factors affecting the positive change in vaccination decisions. Government agencies can use these results to intensify awareness campaigns about the vaccine and combat misinformation, especially among older people and those without college degrees. It is advantageous to use relevant media to convey the benefits of vaccination to the greater part of the population.

## Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

## Author Disclosure

All authors declared no conflicts of interest.

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## APPENDIX

Annex 1. Descriptive Statistics				
Var Name	Measures	No Change (N=154)	Change (N=147)	Total (N=301)
		Mean (SD)	Mean (SD)	Mean (SD)
CVIS1	Family and friends	3.4(1.19)	3.53(1)	3.46(1.1)
CVIS2	Coworker	2.1(1.34)	2.58(1.33)	2.34(1.36)
CVIS3	Healthcare worker	2.67(1.38)	3.05(1.2)	2.86(1.31)
CVIS4	Government	2.81(1.45)	3.03(1.31)	2.91(1.38)
CVIS5	TV	3.28(1.49)	3.56(1.22)	3.42(1.37)
CVIS6	Newspaper	1.98(1.36)	2.31(1.26)	2.14(1.32)
CVIS7	Radio	2.58(1.52)	2.76(1.43)	2.67(1.47)
CVIS8	FB	3.19(1.52)	3.93(1.11)	3.55(1.38)
CVIS9	Instagram	1.66(1.19)	2.26(1.38)	1.95(1.32)
CVIS10	Twitter	1.49(1.13)	1.97(1.31)	1.73(1.25)
CVIS11	Tiktok	1.79(1.29)	2.26(1.36)	2.02(1.34)
CVIS12	Youtube	2.4(1.51)	2.73(1.28)	2.56(1.41)
AWARE1	COVID-19 vaccines differ in their compositions and come in different brands.	0.56(0.7)	0.84(0.47)	0.69(0.61)
AWARE2	COVID-19 vaccines are effective at helping protect against severe disease and death.	-0.15(0.9)	0.82(0.52)	0.32(0.88)
AWARE3	There may be side effects after COVID-19 vaccination and these are not normal.*	-0.47(0.8)	-0.92(0.36)	-0.69(0.66)
AWARE4	Everyone aged 12 years and older are recommended to get vaccinated.	-0.01(0.9)	0.61(0.66)	0.29(0.85)
AWARE5	COVID-19 vaccines are available in the Philippines for everyone at no cost.	0.68(0.66)	0.88(0.42)	0.78(0.57)
AWARE6	It typically takes two weeks after vaccination for the body to build protection (immunity) against the virus that causes COVID-19	0.2(0.74)	0.71(0.56)	0.45(0.71)
AWARE7	People may not receive all recommended doses of a COVID-19 vaccine.*	-0.29(0.72)	-0.2(0.86)	-0.25(0.79)
AWARE8	COVID-19 vaccines contain microchips and can change or alter my DNA.*	-0.05(0.75)	0.39(0.72)	0.17(0.77)
AWARE9	There are priority groups in the Philippine government's COVID-19 vaccination program.	0.51(0.68)	0.59(0.68)	0.55(0.68)
WORRY1	I am scared about getting infected with COVID-19	3.46(1.25)	4.08(1.06)	3.76(1.2)

WORRY2	The possibility of getting infected in the future with COVID-19 concerns me	3.34(1.17)	4(1.02)	3.66(1.15)
WORRY3	I don't really worry about getting infected with COVID-19*	2.82(1.22)	2.1(1.06)	2.47(1.2)
FHL1	Did you find words you didn't know?*	2.07(0.91)	2.2(0.71)	2.13(0.82)
FHL2	Did you find that the texts or images were difficult to understand?*	2.33(1)	2.5(0.81)	2.42(0.91)
FHL3	Did you need much time to understand them?*	2.4(1.09)	2.41(0.87)	2.4(0.98)
FHL4	Did you or would you need someone to help you understand them?*	2.56(1.14)	2.53(0.88)	2.54(1.02)
VAXCON1	Vaccines are necessary to protect health.	3.85(3.11)	8.29(2.16)	6.02(3.49)
VAXCON2	Vaccines do a good job in preventing the diseases they are intended to prevent.	3.74(3.02)	7.51(2.61)	5.58(3.4)
VAXCON3	Vaccines are safe.	3.3(2.82)	7.19(2.45)	5.2(3.28)
VAXCON4	If I get vaccinated there can be serious side effects.*	2.73(2.88)	3.86(2.83)	3.28(2.9)
VAXCON5	In general, medical professionals in charge of vaccinations have my best interest at heart.	4.3(2.8)	7.3(2.6)	5.8(3.1)

\*reverse coded